

Appl. No. 10/502,111

Attorney Docket No. 10555-091

I. Listing of Claims

1. (Original) An avalanche photodiode comprising:
an absorption layer disposed on a substrate layer;
a multiplication layer disposed on the substrate layer; and
a carbon-doped charge control layer disposed between the absorption layer and the multiplication layer.
2. (Original) The avalanche photodiode of claim 1 wherein the absorption layer is disposed between a first digital graded layer and a second digital graded layer.
3. (Original) The avalanche photodiode of claim 1 further comprising an n-type contact layer disposed between the multiplication layer and the substrate.
4. (Original) The avalanche photodiode of claim 1 further comprising a p-type contact layer.
5. (Original) The avalanche photodiode of claim 1 further comprising a buffer layer disposed between the n-type contact layer and the substrate.
6. (Original) The avalanche photodiode of claim 1 wherein the absorption layer is InGaAs.
7. (Original) The avalanche photodiode of claim 1 wherein the multiplication layer is InAlAs.

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8. (Original) The avalanche photodiode of claim 1 wherein the carbon-doped charge control layer is carbon-doped InAlAs.

9. (Original) The avalanche photodiode of claim 1 wherein the carbon-doped charge control layer is between 2 and 100 angstroms in thickness.

10. (Original) The avalanche photodiode of claim 1 wherein the carbon-doped charge control layer is between 5 and 50 angstroms in thickness.

11. (Original) The avalanche photodiode of claim 1 wherein the carbon-doped charge control layer is between 5 and 35 angstroms in thickness.

12. (Original) The avalanche photodiode of claim 2 wherein the first digital graded layer is InAlGaAs, and further wherein the second digital graded layer is InAlGaAs.

13. (Original) The avalanche photodiode of claim 3 wherein the n-type contact layer is one of InP or InAlAs.

14. (Original) The avalanche photodiode of claim 4 wherein the p-type contact layer is one of InP or InAlAs.

15. (Withdrawn) A method of fabricating an avalanche photodiode comprising the steps of:

- providing a substrate layer;
- depositing a multiplication layer;
- depositing a carbon-doped charge control layer; and
- depositing an absorption layer.

BRINKS
HOFFER
BILSON

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16. (Withdrawn) The method of claim 15 further comprising the step of depositing an n-type layer to collect electrons.

17. (Withdrawn) The method of claim 15 further comprising the step of depositing a p-type layer to collect holes.

18. (Withdrawn) The method of claim 15 further comprising the step of depositing a digital grading layer to prevent carrier trapping between bandgap offsets.

19. (Withdrawn) The method of claim 15 further comprising the step of doping an InAlAs material with carbon.